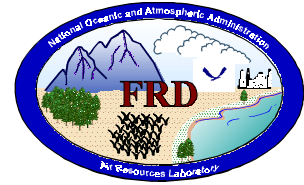




FRD Activities Report June 1999



Research Programs

Cluster Analysis of Southeast Idaho Wind Fields

A cluster analysis of the wind fields in southeast Idaho is being performed using data collected from the INEEL mesoscale meteorological network. The natural clusters are identified using iterative adjustment of clusters. The analysis for the year 1997 was completed in March and showed seven natural clusters or wind field patterns. The years 1994 and 1995 were completed this month. 1994 showed the same seven clusters as 1997. 1995 had only six natural clusters, which matched well with six of the clusters from 1997 and 1994. The fact that one cluster was missing may have been due to a much smaller number of points being available from 1995 caused by anemometer icing. The analysis will be performed for 1996, 1998, and then a combination of several years.

The goals of this analysis are to provide climatology information about the region and to develop wind forecasting aids. For example, the 1997 analysis showed that 37% of the wind fields fell into clusters with significantly reduced wind velocities around the north end of the INEEL. This could be significant for siting of facilities such as the satellite launch facility being proposed for the INEEL. Also, statistics such as average duration of each cluster and probabilities of one wind field type evolving into each of the others may prove to be valuable aids to forecasters. ([Roger Carter@noaa.gov](mailto:RogerCarter@noaa.gov))

Air Force Technical Applications Center (AFTAC) Experiment

Assembly of the AFTAC tracer release, mesonet, MDIFF model output, and mobile analyzer data sets continued. The reprocessing of the AFTAC SF₆ concentration data from the TGA-4000 continuous analyzers was complete this month. During the initial processing, each plume that was measured was separated and placed in a separate data file. After examining these results, we felt that the purposes of the experiment would be better served by combining complete transects of the sampling arcs together, which was done in the reprocessing. (Kirk.Clawson@noaa.gov, Roger Carter)

Shoaling Waves Experiment (SHOWEX)

We are cooperating with Dr. Ken Melville at Scripps Institute of Oceanography to develop a new Wave Breaking and Dissipation measurement system for the November SHOWEX. The Modular Aerial Sensing System (MASS) will measure the kinematics and dynamics of breaking waves in the transition zone between deep-water breaking and depth-limited breaking on the continental shelf. MASS will allow the geometry, kinematics, and statistics of breaking leading to whitecaps to be measured using video imagery from the LongEZ. Image sequence analysis will be used to determine $L(c)dc$, the length per unit area of breaking crests in the velocity range $(c, c+dc)$. Ken will correlate

this fundamental statistical distribution function and its moments with bottom topography and with wind and wave variables, including the wave directional spectrum. We tested MASS in November 1977 on the LongEZ. See <http://www-mpl.ucsd.edu/people/melville/MASS.htm> for more information and an exciting animation video of a breaking wave. (Ken Melville, kmelville@ucsd.edu, Tim Crawford)

BRAVO Perfluorocarbon Tracer Study

The Big Bend Regional Aerosol and Visibility study (BRAVO) is a field program designed to determine the sources of haze episodes which reduce visibility at Big Bend National Park (BBNP). The cause of these episodes is sulfate aerosol formed from gaseous sulfur emissions resulting from the combustion of coal. The worst periods of visibility degradation occur from July to the end of October.

Three automated systems to release perfluorocarbon tracers were installed at a site in Eagle Pass, Texas during the week of June 21. One system will release tracer continuously. The other two systems will release tracer for twelve hours, from 20:00 to 8:00 on alternate days. This staggered tracer release will provide a time stamp so tracer released during nighttime periods can be distinguished at the receptor sites. Tracer release will begin on July 5. A fourth system will be installed at the Big Brown power plant in early July. Data from the release systems will be collected over phone lines. The results will be used to determine the sources of sulfate which cause the haze episodes at Big Bend.



FRD Perfluorocarbon tracer release mechanisms installed at Eagle Pass, TX.

BRAVO participants include:

U. S. Environmental Protection Agency, Region 6
U. S. National Park Service
U. S. Department of Energy, Brookhaven National Laboratory
Texas Natural Resources Conservation Commission
University of California, Davis
Desert Research Institute, University of Nevada

A more detailed description of the project as well as data and photos can be seen at <http://www.noaa.inel.gov/frd/Projects/bravo.html>. ([Tom Watson@noaa.gov](mailto:Tom.Watson@noaa.gov), [Randy Johnson](#), and staff)

Over-Land Along-Wind Dispersion (OLAD) Project Data Reporting

Chris Biltoft from the Meteorology and Obscurants division of the U.S. Army Dugway Proving Ground spent two days visiting FRD to work on the data from the 1997 Over Land Along Wind Dispersion (OLAD) project. Work is progressing on two technical reports and an article to be published in a peer reviewed journal. ([Tom Watson@noaa.gov](mailto:Tom.Watson@noaa.gov))

Cooperative Research with INEEL

Radar Wind Profiler Repair

During a routine check of the 915-MHz radar wind profiler located on the INEEL, it was discovered that three of the four audio speakers used for temperature profiling were inoperable. In addition, the supports for the radar antennas were deteriorating. The speakers have been repaired and placed back into operation. We are planning to construct new supports for the radar antennas that will be less subject to weathering. The computer system was found to be Y2K compliant. ([Roger Carter@noaa.gov](mailto:Roger.Carter@noaa.gov))

INEEL Emergency Planning Support

At the request of the INEEL Emergency Planning group, a set of "fake weather" data was constructed for use in an emergency response drill. During the drill, participants will switch their INEELViz workstations to a special mode and the "fake weather" will be displayed instead of real time measurements. The drill is designed to practice response to a wild fire near a major INEEL facility. The winds included in the "fake weather" will move the fire towards a particular part of the facility that the planning group wants involved in the drill. The drill will be repeated five times this summer with different participants. This method of using specially tailored weather conditions in emergency response drills has been used for several years at the INEEL because this feature was built into the FRD designed INEELViz meteorological display program. It allows participants to access and respond to weather data exactly as they would in a real emergency while still offering the advantage of using pre-chosen conditions for the drill. ([Roger Carter@noaa.gov](mailto:Roger.Carter@noaa.gov))

INEELViz Reliability

Over the past several years, we have made a conscious effort to make the distribution of meteorological data via INEELViz as reliable as possible. For one week this month, the telephone line carrying our Internet connection experienced frequent errors. This caused numerous lost connections and errors while accessing the Internet. Thanks to the redundancy and error handling built into the system, the INEELViz workstations distributing data to the emergency response centers around the INEEL continued to operate without a single reported problem. ([Roger Carter@noaa.gov](mailto:Roger.Carter@noaa.gov), Brad Reese)

INEEL Mesoscale Meteorological Network Data Integrity

The data collected from the INEEL mesoscale meteorological network is routinely backed up to CD-ROMs for permanent storage. One copy is stored in a fireproof safe in the FRD office. The second copy has now been moved out of the FRD building to a fireproof safe in a storage facility about two blocks away. Placing the second copy outside the FRD building reduces the possibility that fire, flood, etc. would destroy all copies of the data. ([Roger Carter@noaa.gov](mailto:Roger.Carter@noaa.gov))

Other Activities

Publications

The perception of many outside of FRD has been that the FRD staff has been so involved doing field studies and taking measurements, that they have not had the time or opportunity to write about them. Not so! The first FRD publication came out just months after the division was established, and there has been a constant stream of them since. A list of many of the FRD staff publications has been compiled and posted on the FRD web site. Our publication record covers nearly 50 years - from 1950 to 1999 - and shows the Division's widely diverse research activities and accomplishments during the last half-century. There is also a glimpse of work-in-progress that will appear in the next half-century. You can view the list at <http://www.noaa.inel.gov/frd/pubs.html>. ([Joyce Silvester@noaa.gov](mailto:Joyce.Silvester@noaa.gov), Tim Crawford)

So far in June 1999, the following conference publications were presented:

Vandemark, D., T. Crawford, R. Dobosy, T. Elfouhaily and B. Chapron, 1999. Sea surface slope statistics from a low-altitude aircraft. IEEE Proceedings of International Geoscience and Remote Sensing Symposium (IGARSS), Hamburg, 28 June - 2 July. Presented by Doug Vandemark. See the full text at <http://www.noaa.inel.gov/frd/Personnel/Tim/slopstat.pdf>

Vandemark, D., P. Mourad, T. Crawford, C. Vogel, J. Sun, 1999. Measured correlations between roll-vortex signatures and radar-inferred sea surface roughness. IEEE Proceedings of International Geoscience and Remote Sensing Symposium (IGARSS), Hamburg, 28 June - 2 July. Presented by Doug Vandemark.
See <http://www.noaa.inel.gov/frd/Personnel/Tim/roll.pdf>

Dobosy, R.J., T. L. Crawford, D. Vandemark, C.A. Vogel, 1999. Measurement of Ocean Surface in Shoaling Zones by Laser Array and Ka-Band Radar. Fourth International Airborne

Remote Sensing Conference and Exhibition, ERIM International, 21-24 Jun., Ottawa, Ontario, Canada. Presented by Ron Dobosy. See http://www.noaa.inel.gov/frd/Personnel/Tim/ottawa_cnf.pdf

The following conference publications for June 1999 have been submitted:

Carter, R. G. and R. Ridenour, 1999: Automatic Short Term Dispersion Forecasting Using Historical Pattern Matching. Submitted to the ANS 7th Topical Meeting on Emergency Preparedness and Response. The full text is available at <http://www.noaa.inel.gov/frd/Personnel/Roger/er99.pdf>

Sagendorf, J. F. and D. W. Walker, 1999: Accident risk assessment using a puff trajectory atmospheric diffusion model. Submitted to the ANS 7th Topical Meeting on Emergency Preparedness and Response. See <http://www.noaa.inel.gov/frd/Personnel/JerryS/er99.pdf>

The following manuscripts are in preparation during June:

Vandemark, D., S. Bailey, P. Mourad, T. Crawford, C. Vogel, J. Sun, d. Thompson, 1999. Measured changes in ocean surface roughness due to atmospheric boundary layer rolls. In final draft, to be submitted to JGR for publication.

Crescenti, G. H., T. L. Crawford, and E. J. Dumas, 1999: Data report: LongEZ participation in the 1999 Shoaling Waves Experiment (SHOWEX) Spring pilot study. NOAA Tech. Memo., Air Resources Laboratory, Silver Spring, MD, *in preparation*.

Crescenti, G. H., K. L. Clawson, B. R. Reese, D. W. Walker, and W. J. Behymer, 2000: The Idaho Environmental Monitoring Network. Preprint, *Ninth Symposium on Education*, Long Beach, CA, Jan. 9-14, Amer. Meteor. Soc., *in preparation*.

Crescenti, G. H., and R. A. Baxter, 2000: Sodar based wind profiles as model inputs: understanding the role of atmospheric conditions in assessing the quality of data. Preprint, *11th Joint Conference on the Applications of Air Pollution Meteorology with the A&WMA*, Long Beach, CA, Jan. 9-14, Amer. Meteor. Soc., *in preparation*.

Papers Reviewed

Douglas, S. G., C. G. Lindsey, T. P. Lockhart, R. A. Baxter, T. S. Dye, D. T. Bailey, J. S. Irwin, and K. L. Schere, 1999: EPA workshop on the collection and use of upper-air meteorological data for regulatory modeling applications. To be submitted to the Bulletin of the American Meteorological Society, ARL peer-review by Jerry H. Crescenti.

New Employees

Last month we reported Dr. Jeffery French had joined the FRD team. To learn more about Jeff, view his home page at <http://www.noaa.inel.gov/frd/Personnel/Jeff/french.html>.

Travel

Thomas B. Watson, Randall C. Johnson, Shane Beard, James Angell and Darrell Hanni traveled to Eagle Pass, Texas June 13-July 10, 1999, to install the tracer release systems for the Big Bend Regional Aerosol and Visibility study (BRAVO).

Kirk Clawson traveled to Pocatello, ID Saturday, June 26, 1999. He represented FRD at the 100th anniversary celebration of the Pocatello NWS Forecast Office. It was a very informative and interesting open house.

Visitors

Former meteorologist and FRD Acting Director Gene Start visited FRD on June 4, 1999 to discuss research on the development of objective measures of diffusion. Data acquired from the 300-m Boulder Atmospheric Observatory (BAO) tower during the 1995 Ground-Based Remote Sensor Characterization Study are being analyzed by Dr. Solomon Leung of Idaho State University, Gene Start and Jerry Crescenti.

Ji-hoon Lee, Hauin-Joo Choi, and Jeong-Hyomi Youn of the Korea Electric Power Corporation (KEPCO) visited FRD on June 6, 1999. These KEPCO representatives were interested in developing meteorological monitoring and modeling programs for their power plants in South Korea. Several FRD staff members demonstrated the capabilities of the INEEL mesonet and the data acquisition and display program INEELViz.

Christopher Biltoft, meteorologist from the U. S. Army Dugway Proving Ground, visited FRD from June 7-9, 1999. We discussed scientific findings for the Over-Land Along-Wind Atmospheric Dispersion (OLAD) Experiment and the development of other cooperative research efforts.

Dr. Jeffery Tilley of the University of Alaska-Fairbanks presented a seminar on June 18 to the FRD staff. His presentation was on the use of MM5 in Arctic mesoscale forecasting.

Dr. Douglas A. Johnson with the USDA Agriculture Research Service in Logan, UT visited FRD on June 24. A tour of the INEEL was given and discussions were held on collaborative efforts with the ARS on carbon flux measurements in sagebrush steppe ecosystems. This type of ecosystem covers vast areas of the western U.S. including the major portions of the states of Idaho, Washington, Oregon, Montana, Wyoming, Colorado, Utah, and Nevada. To date, the carbon dioxide measurement effort has concentrated mainly on forest ecosystems. A site was selected where FRD and the ARS will jointly install both eddy correlation and Bowen Ratio measurement systems for year-round measurements of CO₂.